

APRIL 1, 1950
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AMERICAN FERTILIZER

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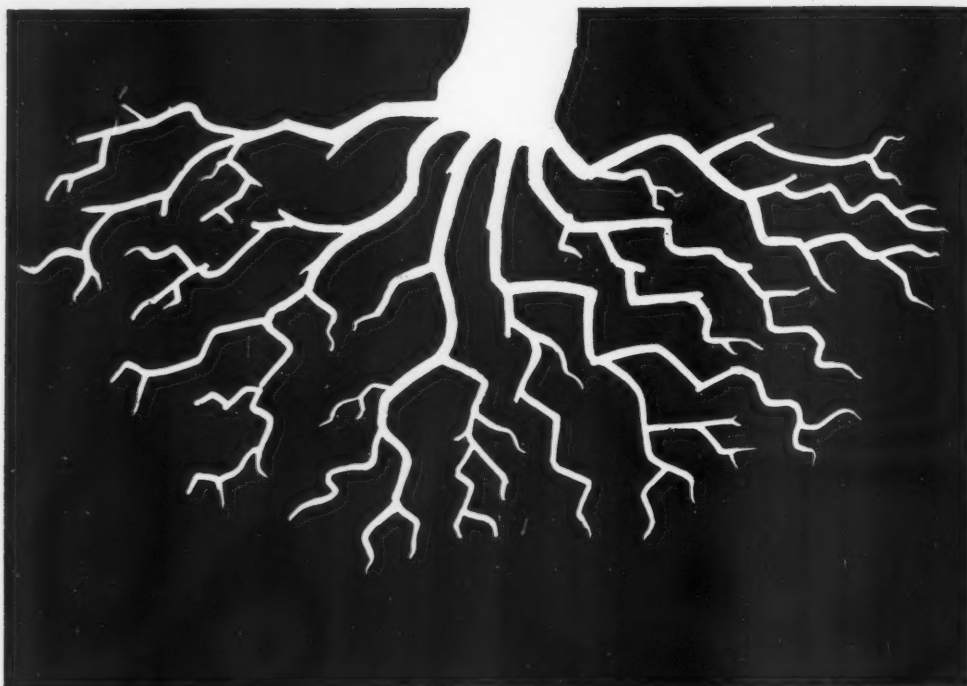
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Annual Meeting

Middle West

Soil Improvement Committee



AGRONOMISTS and soils men from 13 Midwestern agricultural colleges presented reports on recent developments in fertilizer research at the annual meeting of agronomists and representatives of the fertilizer industry held at the Palmer House, Chicago, on February 24th. The meeting was sponsored by the Middle West Soil Improvement Committee.

Dr. F. C. Bauer of the University of Illinois presided. The 197 who registered for the meeting included representatives of companies in the farm machinery, supplies and equipment industries, in addition to the agronomists and fertilizer men.

The morning and early afternoon sessions were devoted to reports by agronomists from the 13 state agricultural colleges on new studies in soils, crops and fertilizers.

Dr. K. C. Berger, University of Wisconsin, declared that toxic effects of manganese on such crops as potatoes, alfalfa, sweet clover and sometimes corn can be overcome by adding 500 pounds per acre of finely ground dolomitic limestone which reduces the solubility of the manganese. He listed oats, wheat, barley and red clover as crops with a high manganese requirement and a high tolerance to manganese toxicity. Dr. Paul L. Carson, South Dakota State College, reported that 1949 tests with small grains bore out past experience that the most efficient fertilizer in that state is nitrogen and phosphorus applied in equal amounts. Dr. E. B. Norum, North Dakota Agricultural College,

said that drilling superphosphate gave considerably higher yields than broadcasting the fertilizer. In addition, the drill method consistently improved the crop's ability to compete with weeds.

Dr. J. B. Page of Ohio State University reported the effects of the soil's physical condition on fertilizer response. Soil tilth, he said, has a marked effect on the efficiency of fertilizer in boosting crop yields. Poor soil structure can be the first limiting factor in crop production, he declared.

Nebraska Recommendations

Dr. M. D. Weldon, University of Nebraska, declared the college's recommendations for the use of commercial fertilizer emphasize: selection of fertilizer according to soil deficiencies and crop responses of the state's several soil regions; use of phosphate on legume crops in the rotation; use of nitrogen fertilizers on corn and other row crops, grasses and small grains; the use of phosphate on small grains and specialized crops; proper placement of fertilizer.

Prof. A. W. Klemme, University of Missouri, reported that heavier applications of plant food are being added on Missouri farms to restore the mineral plant nutrient reserves. Farmers in Missouri's Balanced Farming Program, he said, use an average of 7 tons of fertilizer per farm per year, as compared to about 2 tons where they are not enrolled in the program.

Dr. C. O. Rost, University of Minnesota, declared that increasing

amounts of commercial fertilizer are needed under the state's soil-depleting cropping system. Tests indicate that for oats a combination of nitrogen and phosphate fertilizer give maximum yields on most soil types, and that potash should be included when grass seedlings are made in small grains. The inclusion of potash in the fertilizer for corn is essential for top yields. Tests on both corn and oats, he said, emphasize the importance of nitrogen in the fertilizer mixture.

Dr. L. M. Turk, Michigan State College, described beneficial results obtained from fertilizing muck soils. Crops grown on muck soils respond to large quantities of commercial fertilizer, although many crops vary in their requirements. Micronutrients are highly important in muck crop production, he said. Salt and sulphur are recommended, depending on the soil reaction and the crop grown. Dr. R. L. Cook of Michigan State College summarized the results of fertilizing barley, white field beans and soybeans, corn and sugar beets. He reported that the effect of legumes in the rotation on 1949 corn yields was the greatest in the history of Michigan research. Tillage experiments showed that plowing and fitting the soil in one operation, was the most satisfactory method of seedbed preparation.

Charles E. Bortner, University of Kentucky, declared that a large supply of plant food is necessary for the production of high-yielding, high-quality burley tobacco. Plenty of phosphate and potash is the first

essential, but a good supply of nitrogen, also, is needed for satisfactory yields. Unless the application is large or the soil is high in fertility, part or all of the plant food should be applied along the row, in bands 3 to 4 inches from the plants and 3 to 4 inches below the surface.

Two reports were presented by Floyd W. Smith of Kansas State College. One summarized the results of 25 years of soil fertility investigation at Columbus, Kansas, on corn, soybeans, small grains. Yield data from plots receiving good soil management and liberal amounts of fertilizer indicate that soil productivity has been increased. On untreated plots there has been a general decline in fertility, he reported. Mr. Smith's second report dealt with 1949 fertilizer studies on wheat at four different locations, plus two additional experiments on the use of anhydrous ammonia.

Hill Fertilization

Lloyd Dumenil, Iowa State College, said that hill fertilization of corn with nitrogen, phosphate and potash has given the most profitable results in corn tests. Top-dressing legume stands with phosphate, brought yield increases in about 3 out of 4 tests. Half the fields showed increases from top-dressing with potash, he declared.

Dr. A. J. Ohlrogge, Purdue University, reporting on tracer phosphorus tests with corn in Indiana, said that adding nitrogen and potash to phosphate fertilizer greatly increased the corn crop's early uptake of phosphorus from the added plant food. Supplementing row fertilization with 120 pounds per acre each of nitrogen and potash applied in bands 6 inches deep and 14 inches apart, doubled the corn plant's recovery of phosphorus from the applied fertilizer.

Prof. A. L. Lang, University of Illinois, reported that good soil management as compared to poor management made a difference of 52 bushels of corn an acre in 3-year tests. Organic matter, either as animal manure or crop residues has been the most effective factor in increased yields of corn and wheat,

Wheat, Oats

FERTILIZER

Results in INDIANA

SOME interesting and impressive results of fertilizing wheat and oats have been developed in field demonstration trials on Indiana farms during the past three years.

In 49 combine harvested trials during this period, applications of

he said. In grain systems of farming during the past 4 years, the use of lime, phosphate and potash have returned more than \$6 for every dollar invested in these fertilizing materials.

A question and answer session followed the reading of the papers. Research men discussed additional phases of subjects covered in the reports. At the close of the meeting the agronomists presented their list of recommended fertilizer grades for their particular states for the year beginning July 1, 1950.

In addition to agronomists presenting reports on fertilization tests, the following research men from various Midwestern colleges were in attendance: Paul M. Burson, University of Minnesota; W. H. Pierre and H. B. Cheney, Iowa State College; N. J. Volk, J. B. Peterson and George H. Enfield, Purdue University; P. E. Karraker, University of Kentucky; H. F. Rhoades and F. D. Keim, University of Nebraska; W. A. Albrecht and R. C. Prewitt, University of Missouri; H. E. Myers, Kansas State College; C. E. Evans, Ohio Agricultural Experiment Station; Leo F. Pühr, South Dakota State College; Emil Truog, University of Wisconsin; F. W. Parker, U. S. Department of Agriculture.

At the meeting's conclusion, Z. H. Beers, executive secretary of the Middle West Soil Improvement Committee, expressed the industry's thanks to the agronomists for their steady cooperation in encouraging soil conservation and better farming practices.

150 to 200 pounds of the fertilizer that cooperating farmers were using on wheat produced an average of 5.5 bushels increase per acre over the unfertilized area. Doubling the fertilizer rate produced an increase of 8 bushels. A spring top dressing of about 25 pounds of nitrogen on this heavier rate of fall fertilized wheat produced an additional average increase of 5.5 bushels.

In 39 oats demonstration trials during this same period, a 300-pound application of phosphate-potash goods, of whatever analysis the co-operator was using, produced an average increase of five bushels per acre. Adding nitrogen to make the mixture 3 per cent produced a further average increase of four bushels per acre; 6 per cent, 6.5 bushels; and 12 per cent, 11.5 bushels. Each unit of nitrogen rather consistently produced about an additional bushel of oats. The oats response to fertilizer in 1949 was limited by severe damage by the new "grey spot" disease in a number of the harvested demonstrations.

In most of the oats trials the nitrogen was broadcast as soon as the seedlings had emerged and outlined the strip to be harvested. The phosphate-potash mixture was drilled with the seed.

These demonstrations, planned by Purdue Extension Agronomists, were on farms of good cooperators selected by county agents. They, no doubt, represent at least average or better than the average run of farms in the various counties. In a few cases of high fertility land, the heavier increments of nitrogen produced such heavy growth that the oats lodged.

The effect of the heavier growth of the grain crop on the seedlings of legumes or legume-grass mixtures was observed. Usually the size and growth of the legume seedlings was

(Continued on page 30)

AMERICAN FERTILIZER

By G. P. WALKER
Extension Agronomist
Lafayette, Indiana

POTASH PEACE . . .

THE SPIRITED LETTER in the adjoining columns tells in graphic language a story typical of our times. AMERICAN FERTILIZER is printing it in full for the information of all who have been concerned with the potash strike in New Mexico.

First, as the pioneer journal of the fertilizer industry, we can say with authority that the members are solidly behind the potash producers at Carlsbad. Second, as the press "voice" for the readership of this magazine, we can say that all of us approve the methods used to settle the difficulty. AMERICAN FERTILIZER and most of the readers still believe in the right of a man to work for a living, and this magazine does not intend to take a fence-straddling position on such a serious problem as the Kingsbury letter points out.

A Fine Record

All of the members of the fertilizer industry are proud of the fine record of the potash producers.

Through the years since the Germans began to put the squeeze on American potash contracts, on down through the frantic scrambles during the first World War, and up to the present the potash producers have held the price line as well as any members of the agricultural producers group.

They have asked no tariff favors from Washington, and this important segment of our fertilizer industry has met all competition, and still managed to keep prices at as relatively low a level as any other group in the field.

As a manufacturing group the potash industry is "Exhibit A" in any argument against the misguided trend of today along the Potomac. Government control is in the saddle on Capitol Hill, but all investigations of the American potash industry have resulted in a clean bill of health for the companies. Because of this the whole fertilizer industry supports the decision made and the

KINGSBURY & COMPANY

Agriculture Chemicals
3001 North Emerson Avenue
Indianapolis, Indiana

March 3, 1950

TO ALL D. & K. AGENTS:

A few fertilizer manufacturers bought German potash from the Russian-controlled zone and have used this extra potash as "bait" to take customers away from the rest of us. We were offered Russian-controlled potash at the same black market prices. We did not buy any. We refused to be a party to a scheme which would undermine the position of the American potash producers involved in the strike at Carlsbad.

The Carlsbad producers were up against something more important than a dispute over wages. They were trying to break the stranglehold control which a Communist group had gained over their mine workers. It required courage to face the issue right at the peak of their shipping season. Fortunately for all of us, in the long run, the top officials of the three Carlsbad companies had good red American blood in their veins and they decided to have a show-down then and there. They whipped the Commies.

Suppose we got into war with Russia within the next few years. Wouldn't it have been nice to have a bunch of Communists in control of American potash mines? They could wreck enough machinery in a few hours to really "put us behind the eight ball."

All of the American potash producers deserve your support as well as ours. They have done a magnificent job of making the United States independent of imports from Europe. Remember World War I, when European imports were shut off? The price of potash in this country sky-rocketed to over \$500 per ton!

The American potash producers deserve "a hand" on another score. They have never gouged us, or the American farmer, on prices. All through World War II, while other fertilizer raw materials were advancing sharply, they kept potash prices very reasonable. They are still reasonable. We have no financial interest in any potash company but we feel that you should know the facts. We were "for" the Carlsbad producers 100 per cent, even though it wrecked our production schedules and has given us plenty of headaches.

Few, if any, American farmers are actually going to suffer from a lack of potash on their crops this spring. We will not be able to give you all the high potash goods you want but no one will really suffer.

Very truly yours,

KINGSBURY & COMPANY, INC.,

G. H. Kingsbury

action taken by the potash companies at Carlsbad.

Now that the potash strike in the West is settled and production has returned to normal, AMERICAN FERTILIZER joins with its readers in the hope that common sense and fair dealing will prevail in the future relations of the companies and the unions.

It was necessary for the Carlsbad trio to employ permanent new replacements when the situation reached a crux, and this green, untrained help has slowed somewhat the return to one hundred per cent production. The return of the union

workers helped to alleviate this trained manpower shortage and now the sands of New Mexico are no longer stirred by illegal picketing, attempts to pass the picket line, "vocal" thunder, and all the rest of the too well-known chaos which goes with most strikes in any industry.

AMERICAN FERTILIZER confidently looks toward a better future. The members of the fertilizer industry can take a lesson from the New Mexico incident, and think long and hard about their own plant labor policies and employee relations.

IT COULD HAPPEN TO YOU.

INDIANA

Soil Fertility

A RECENT meeting sponsored by the Southwestern Indiana Wheat Improvement Committee will go down in history as one of the great accomplishments of that organization. The meeting was held at Vincennes, Indiana on March 15th and was designed by H. R. Lathrope, Extension Agronomist, Purdue University, particularly for fertilizer dealers, salesmen, and farm leaders.

Mr. Charles Schenk, current president, presided over this meeting attended by more than 400 key fertilizer industry men and farm leaders.

Dr. J. B. Peterson, Head of the Agronomy Department at Purdue University, pointed out that our soil is a most important basic resource, but that we should appreciate that we farm the climate as well as the soil. Carbon, hydrogen and oxygen of the air constitute 95 per cent and the twelve essential minerals of the soil constitute 5 per cent of the raw materials necessary for plant growth. Dr. Peterson said, "Even though the twelve essential plant nutrients constitute only 5 per cent of the raw materials for plant growth, this is a very important 5 per cent." He further stated that "the reserves of these twelve essential plant nutrients are not enough to indefinitely take advantage of the sun's energy and the carbon, hydrogen and oxygen to synthesize protein and carbohydrates for direct human consumption and for feed for our livestock."

Dr. Peterson Says Must Work Together

Referring to the fertilizer industry, Dr. Peterson said, "We must go along with a fair competitive fertilizer industry in order to replace these minerals."

Referring specifically to the well-

known "pocket" wheat area, Dr. Peterson said that the average yield in this area now is 17.5 bushels per acre. Harold Pirtle, the winner of the 1949 wheat contest, made a yield of 57.5 bushels per acre, indicating that the average yield for the area should be much higher. Dr. Peterson pointed out that one of the most important factors in raising the average yield is the use of adequate commercial fertilizer similar to the fertility program followed by Mr. Pirtle. Mr. Pirtle follows a rotation including legumes. His wheat received 400 pounds of 3-12-12 at seeding time and a spring top-dressing of 20 pounds of N or the equivalent of 100 pounds of a 20 per cent nitrogen material.

Professor Lang Discusses Soil Management Problems

Professor Al Lang, Extension Agronomist at the University of Illinois, discussed his views regarding soil management. Professor Lang said, "Fertilizers do not pay unless you know how to use them." Lang continued, "I am not particularly interested in fertilizing a single crop. I am interested in fertility of the soil and a plan for maintaining soil fertility for the years to come." He further stated, "Nitrogen is our most important problem in Illinois, and we want to get much of our nitrogen from legumes. We must first use plenty of minerals to grow legumes." Lang continued, "Commercial nitrogen cannot be used effectively unless

the soil is in good physical condition and legumes produce the right kind of condition."

Dr. G. N. Hoffer, Midwest representative of the American Potash Institute, also emphasized the importance of good soil tilth. Dr. Hoffer discussed "sweet clover—the missing link" in a most desirable soil fertility program. Dr. Hoffer brought in soil tube samples illustrating how the continuous cultivation and stirring of the soil and the use of heavy equipment produces soil compaction. Dr. Hoffer showed that the use of sweet clover and alfalfa in the rotation is a most effective way of breaking up plow-sole hard pan. Referring specifically

Meet...

to the "pocket" wheat area, Dr. Hoffer definitely showed that sweet clover and legumes are the missing links in that area. Less than 5 per cent of the acreage in the "pocket" wheat area is devoted to legumes and a sound soil fertility program calls for at least 20 per cent of the acreage in sweet clover or alfalfa each year. Dr. Hoffer pointed out that if farmers in this area would follow this type of a program commercial fertilizers would be more effective, and the average yield of wheat could be boosted very significantly.

Dr. William J. Albrecht, Chairman of the Soils Department of the University of Missouri, further emphasized the importance of good soil tilth and particularly the importance of organic matter. Dr. Albrecht said, "Organic matter is a shock absorber to gracefully take the impact of commercial fertilizers. Organic matter to the soil is like a strong constitution in humans." Dr. Albrecht said that farmers should watch the health of their soil and crops just as we watch our own health. He indicated that too many farmers sow seed, brag about its pedigree, and then harvest

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AMERICAN FERTILIZER

Plant

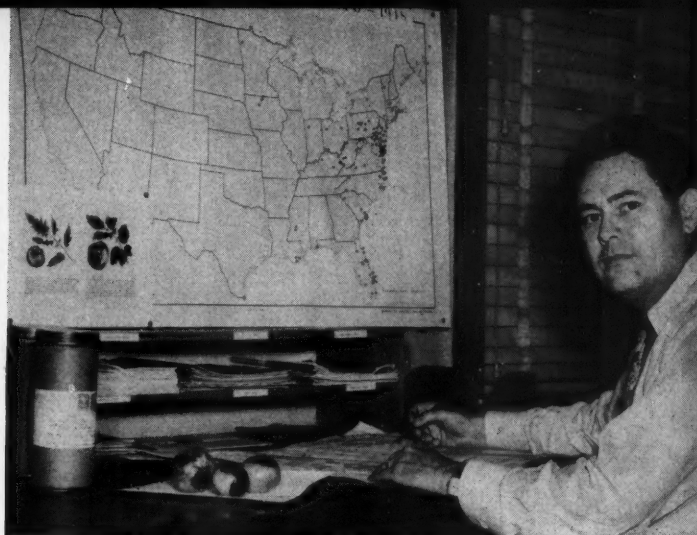
Disease

Survey

BY PAUL R. MILLER

Senior Plant Pathologist,
Bureau of Plant Disease Survey,
U.S.D.A., Beltsville, Md.

(Continued from the issue of March 18, 1950)



The man with the intent look is Paul R. Miller, Senior Pathologist in charge of the Plant Disease Survey and author of this series of articles. This picture was taken in Mr. Miller's office at Beltsville, Md.

The major tasks of the Forecasting Project at present include the Warning Service for the three diseases, late blight of potato and tomato, caused by *Phytophthora infestans* (Mont.) D By., blue mold of tobacco, caused by *Peronospora tabacina* Adam, and downy mildew of cucurbit crops, caused by *Pseudoperonospora cubensis* (Berk. & Curt.) Rostow., in the eastern part of the United States from the Atlantic Coast States west to North Dakota and Texas, and the experimental study of the factors involved in infection, development, spread, and importance of these diseases.

Work Does Not Cover Nation

Perhaps some may wonder just why the work does not extend over the whole country and why these particular diseases were selected. The answer is mainly that some experience had already been obtained with widespread reporting or warning services in the case of each of these diseases and in this general region, and it was thought best to take advantage of this experience and develop a sound basis for operation and judgment before adding further work: in other words, we did not wish to "bite off more than we could chew" with available funds, staff, and background of knowledge. Although forecasting is not new it-

self, this particular combination of widespread warning services and regional research study is so new that it will take some time before all its possibilities can be explored, best techniques devised, and most of all, before any considerable group of professional workers can acquire the specific training and orientation to give them insight into the unique problems and advantages of this special field of plant pathology.

West-East Problems Both Important

Of course, the crop disease problems of the West are just as important as those of the East in their effects on farm welfare and national economy. However, there is such a wide difference in agricultural conditions between West and East that the accompanying disease problems are also quite dissimilar. Western requirements will not necessarily be met by Eastern experience with forecasting. Careful study must determine problems that can be handled better by the Forecasting Project than by any other means, serving the most definite and urgent need and likely to produce the widest benefits. This is as true of future work in the East as it is of prospective work in the West.

You will have noticed that there are two parts to the work of the Forecasting Project: one is the seasonal reporting or warning service,

the other is the fundamental epidemiological study. Before we discuss these, however, perhaps a brief analysis of the applicability and meaning of forecasting will help in understanding why both parts are necessary.

The Meaning and Usefulness of Forecasting

Forecasting the occurrence of plant diseases, on one basis or another, is not a totally new idea. Every attempt to judge the probable development of a disease, from present conditions of infection and environment, and from past observation and experiment on reaction to various factors, is forecasting.

For certain diseases, successful forecasting methods are a regular part of control practice. Apple scab is an outstanding example. Extension pathologists in states where apples are an important crop and apple scab is an important disease conduct a systematic warning service for growers during the growing season. Bacterial wilt of sweet corn, cranberry rots in storage, and wheat leaf rust are other examples of diseases for which practical methods of determining probability of occurrence result in control or in measures to minimize harmful economic effects. There are also the direct precursors gathered up into the Forecasting Project, that is, the



Paul E. Waggoner, a member of the Survey staff. This photo was taken in a field near Crystal Lake, Iowa.

preliminary tomato late blight warning service already mentioned, the potato late blight warning service conducted by the Upper Mississippi Valley Plant Pathologists' Committee, and the informal reporting services on tobacco blue mold and cucurbit downy mildew. All of these show that the need for advance warning is fully recognized and that forecasting is well established as a method of reducing risk from disease.

Plant Diseases Divided into Groups

For forecasting purposes we might divide plant diseases into two main groups. One would contain those diseases that occur year in and year out with only minor variation and are easily controlled if the farmer takes the trouble to apply routine treatment each season. Forecasting is not a particular aid in the control of such diseases, and we might call this the "non-forecast" group.

The other group, the "forecast" group, would be made up of diseases that vary widely in prevalence from season to season according to weather or other circumstances. This group in turn can be divided on the basis of how closely occurrence is tied up with current conditions. In one section are diseases for which the requisite conditions operate far enough in advance so that the grower has plenty of time to take whatever measures he wishes to pre-

vent or minimize loss. In these

It is the second section of this forecast group for which a continuous warning service constitutes the greatest necessity in control, aside from reliable control measures themselves. The development of these diseases is constantly influenced by every change in weather throughout the season. If the necessary conditions are lacking, such diseases may not appear at all for several years in succession. But when all their requirements are fulfilled, they attack

cases a single forecast is sufficient for the season.

suddenly and spread with explosive rapidity. Under such conditions, control measures are wasted unless they are used early enough to prevent general infection and often enough to prevent spread. But money spent on routine measures in years when the disease is absent is also wasted. Obviously, for such widely fluctuating diseases, it is not sufficient to know *how* to control them; for either economy or efficiency in control it is necessary also to know *in advance* when control must be used.

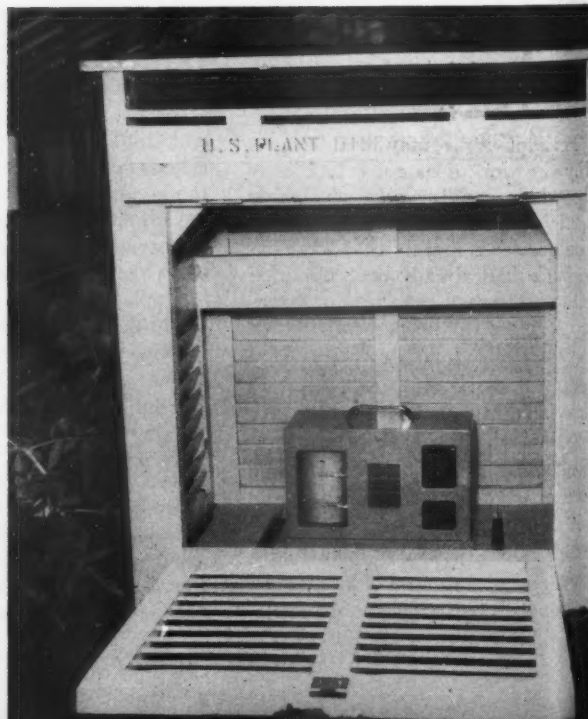
Present Knowledge Is Very Limited

Present knowledge about the way in which these diseases act is only enough to allow pathologists to determine probabilities under given conditions for a short time ahead. Both the disease and the factors affecting its activity must be carefully watched, so that the forecast can be changed if anything should happen to alter the likely course of events. This constant watch is the function of the Warning Service.

It is not possible at present to say definitely what will happen very far in advance or over a wide territory.

(Continued on page 26)

This is a hygrothermograph for use in the Plant Disease Project. This one is in the standard Weather Bureau shelter at plant level.



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APRIL

JANUARY SUPERPHOSPHATE

The Bureau of Census reports that superphosphate production of all kinds totaled a little less than 800,000 tons, basis 18 per cent A.P.A., compared with 836,000 tons in December and 840,000 tons in January, 1949. This drop was in the output of normal superphosphate, the concentrated grades showing an increase of 6,000 tons over December. A smaller tonnage was shipped or used in the producing plants than was manufactured, so that total stocks on hand January 31st had increased to 1,492,000 tons, basis 18 per cent A.P.A.

	Jan. 1950	Dec. 1949	Jan. 1949
Production	Tons	Tons	Tons
Normal, 18%..	662,035	712,643	737,704
Concentrated,			
45%.....	53,050	47,311	39,064
Base Goods,			
18%.....	5,315	5,216	4,912
Shipments and			
Used in Produc-			
ing Plants			
Normal, 18%..	603,548	623,227	758,851
Concentrated,			
45%.....	53,771	45,721	42,526
Base Goods,			
18%.....	5,331	1,352	4,919
Stocks on Hand			
Normal, 18%..	1,212,899	1,139,372	1,204,868
Concentrated,			
45%.....	103,589	104,310	67,219
Base Goods,			
18%.....	20,413	20,430	14,211

BROTHERS JOIN BEMIS 50-YEAR CLUB

How many can say that in 1900 you were working for the company you are now with?

How many have been with their present employers for forty years? Thirty-five? Thirty? Twenty-five?

When A. C. Ewer, manager of the Bemis Bro. Bag Co. Brooklyn plant, celebrated his Golden Anniversary with the company recently, he became the second of two brothers to pass the 50-year mark with Bemis. His brother, F. M. Ewer of the Bemis Boston office, a vice-president and director, reached his 50th anniversary with Bemis three years ago. A total of 103 years of service between them—a record that is seldom duplicated! Both brothers joined the Bemis organization in the Boston office, Frank in November, 1896, and Arthur in February, 1900.

APRIL 1, 1950

Frank Ewer was transferred to San Francisco in 1900 as assistant manager. His next move was to the company's headquarters in St. Louis for a short time, and then back to Boston until 1906, the year of the San Francisco earthquake. He was elected assistant treasurer in 1918, treasurer and a director in 1921, and in 1940 became a vice-president.

Arthur Ewer, now manager at Brooklyn, after serving ten months in Boston, was transferred in 1900 to St. Louis and the following year took charge of the Denver Sales Office. He went to San Francisco as assistant manager in 1912 and was sent to Memphis as manager in 1916. When construction was started on the Brooklyn factory he was sent there and was appointed manager in 1935.

Both brothers have fond memories of their association with Judson M. Bemis, founder of the company, and they both say they have benefited much by their years of association with him.

NEW CHICAGO OFFICE FOR KRAFT CORPORATION

Kraft Bag Corporation, makers of heavy-duty, multi-wall shipping sacks, announces the opening of a western sales office in the *Daily News Bldg.*, Chicago 6, Illinois.

The office is under the management of Ernest A. Kendler, who has been with the Gilman-affiliated company for over 25 years.

Kraft Bag also announced recently the opening of a new bag plant at St. Marys, Georgia. The Kraft Bag Corporation is one of the wholly-owned affiliated companies of Gilman Paper Company, New York.

53 YEAR RESEARCH ON RHODE ISLAND CROPS

Rhode Island Bulletin No. 303 reports a half century of crop rotation experiments designed to determine whether yields of farm crops could be maintained over a period of years by using fertilizer alone without manure. Final conclusions indicate that crop yields have been satisfactorily maintained over a 53-

year period without use of stable manure, although evidence gained suggests that manure occasionally applied in a rotation is beneficial. A farmer should adopt the cropping system which promises to return the largest net profit over the years without depleting fertility reserves.

1950 ACREAGE ESTIMATES RELEASED BY CROP BOARD

A recent release from the Crop Reporting Board of the Bureau of Agricultural Economics gives prospective plantings for 1950. AMERICAN FERTILIZER publishes these estimates based upon reports from farmers in all parts of the country, on or about March 1st, regarding their acreage plans for the 1950 season.

The largest per cent of increase over 1949 plantings is found in sugar beets with an estimated increase of 27 per cent. Barley and sorghum increases are set at about 24 per cent; soybeans at 18 per cent; sweet potatoes at 10 per cent; oats will run 8 per cent; hay will be 3 per cent higher than 1949, and cowpeas will be 1 per cent above last year.

Acreage decreases are to be found in the estimated figures for corn, wheat and potatoes. Corn is off 6 per cent, wheat 13 per cent, and potatoes a little more than 3 per cent.

CROP	Planted Acreages	
	1949	Indicated 1950
	Thousands	
Corn, all.....	87,910	82,765
All spring wheat.....	22,559	19,727
Durum.....	3,693	3,260
Other spring.....	18,866	16,467
Oats.....	44,525	47,964
Barley.....	11,208	13,879
Flaxseed.....	5,199	4,027
Rice.....	1,839	1,645
Sorghums for all purposes.....	11,754	14,568
Potatoes.....	1,924	1,862
Sweet potatoes.....	548	603
Tobacco.....	1,626	1,582
Beans, dry edible.....	1,900	1,678
Peas, dry field.....	367	281
Soybeans.....	11,409	13,500
Cowpeas.....	1,177	1,192
Peanuts.....	2,929	2,570
Hay.....	72,835	75,091
Sugar beets.....	769	980

AMERICAN FERTILIZER

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GRASS ROOTS

In sifting through the mail for some of the comments made by AMERICAN FERTILIZER readers on our recent editorial efforts to alert the fertilizer industry to the need for a strong public relations program we find one word occurring and re-occurring—"grass-roots."

The progressive men in the field all realize that nothing really lasting and effective happens from the top down. The "man-in-the-field" is the final voice of authority on the forward march of progress in the agricultural world. Perhaps some of us don't like to think so but it is our farmer friends who keep us in business and not anything else. You can print the stories send the letters, make the talks, hold the meetings, send out the salesmen, step up production, and do all of the other things to make the plant wheels go 'round. It is all wasted effort if you do not have the friendship of "grass-roots" customers.

Fertilizer manufacturers, agronomists, salesmen and the many others in the plant food field know the value of "planting" at the "grass-roots" level and taking good care of the growing crops.

Well, now we have to switch our expert knowledge of this crop and soil relations and apply the acquired knowledge to the field of "human relations"—the better term for public relations.

We have to tell and sell our story of "A Century of Progress With Fertilizer" to the two groups in America who would and should listen: the fertilizer-conscious farmers and the ultimate urban consumers.

Fertilizer, like this spring weather, is always being talked about, but there are too few of us who have the authority the influence, the experience, the technical knowledge, and the "gumption" to get up off of our ligfat complacency and tell, sell and so swell the total volume of sales.

SPRING JUST POPPED UP on the calendar last week. In the spring a young farmer's thoughts lightly turn to thoughts of increased crop production.

Which brings us to our "grass-

AMERICAN FERTILIZER

roots" problem of increased sales based on good public relations.

Now is the strategic time to open up full blast with the complete public relations program: advertising, radio, direct mail, employee labor relations, stockholder relations, dealer and customer relations, legislative and government relations, and, as we said, plain ole' human relations.

Nineteen fifty should be "Fighting Fifty" for fertilizer folks because another year may be too late to stem the Truman tide along the Potomac. The plant food rock of agricultural economics on which we now stand, safe and dry above the Washington whirlpool, may soon be engulfed by the Sea of Red Tape and the Gulf of Government Control.

As an industry we have to get down to the "grass-roots" and initiate and accelerate our separate and collective public relations programs.

We are like the beautiful young maiden in the big, dark forest who died an old maid. She never got out of the woods. Her public relations were so poor that passing prospects for husbands never heard of her beauty and charm.

Let's get out of the woods.

Let's let our prospective customers know the fine story of our industry. Let's woo our future customers with our excellent past records, our splendid present production and our ambitious future expansion plans.

At the conventions in June and July we should talk long and hard about where we are going and not where we have been.

CHASE APPOINTS NEW DIVISION MANAGER

Chase Bag Company has announced the appointment of Frederick E. Gross as Manager of Chase's Paper and Paper Bag Division.

During his many years of management experience, Mr. Gross has gained a broad background not only in paper and paper bag manufacturing, but in allied industries as well. Mr. Gross, formerly of New Orleans, will make his new headquarters in the General Sales Office in Chicago.

APRIL 1, 1950

I. M. & C. APPOINTS NEW MARKET SURVEY EXPERT

International Minerals & Chemical Corporation recently appointed Dr. R. P. Thomas, professor of soils at the University of Maryland, as market survey specialist for the company's plant food division, according to an announcement by Louis Ware, president.

Dr. Thomas will work under the supervision of Maurice H. Lockwood, vice-president in charge of the plant food division. The Maryland professor is on six months leave of absence from the university. He is a graduate of the University of Illinois and studied at the Universities of Iowa and Wisconsin.

NFA DISTRIBUTES NEW "BILLS" AND POSTER AIDS

The ever-expanding public relations division of The National Fertilizer Association under the direction of W. E. Chace, recently sent to all NFA members copies of a number of effective posters. As a public service the NFA Publicity Department also prepared a clever fertilizer dollar "bill" which, they report, is being purchased and distributed in the tens of thousands.

AMERICAN FERTILIZER received good readership response to the last two editorials on the need for a strong public relations program by all members of the fertilizer industry. Dr. Chace's striking posters are certainly in line with our editorials and the progressive thinking of the members. One poster in green and black is headed "Don't Gamble on Crops!" and the other in orange and black stresses "Your Standard of Living Depends on Fertilizer."

Other copy on the two posters emphasizes the facts that \$1 invested in fertilizer brings \$4.42 in wheat, and one fifth of our farm production comes from fertilizer.

In addition NFA also offers four other black and white posters with cotton, tobacco, wheat, and corn returns from fertilizer usage "played up" in the printed matter.

It is a noteworthy job and certainly an aid to the "Century of Progress with Fertilizer" effort.

WARD IS NEW GTM AT MATHIESON CHEMICAL

Mathieson Chemical Company, Baltimore, announced recently the appointment of Donald G. Ward as general traffic manager. Harry M. Mabey, general traffic manager since 1920, has been promoted to special traffic consultant.

Mr. Ward, who was formerly assistant general traffic manager of Shell Oil Company and Shell Chemical Corporation, has had twenty-six years' experience in traffic management. He joined the Shell organization in 1929 after a period with the Santa Fe Railroad and the Southern Pacific and Union Pacific railroads. During the recent war he served for three and a half years as assistant manager of the British Petroleum Board.

Mr. Mabey has been a leader in anhydrous ammonia distribution, and under his direction Mathieson was the first company to ship caustic soda in a liquid form.

Obituary

HENRY E. PERRY

Henry E. Perry, 60, president of Commercial Solvents Corporation, died March 15th in New York.

Mr. Perry, well-known to many friends in the fertilizer industry, joined CSC in 1922 as engineer in the Terre Haute, Ind., plant. In 1934 he was made vice-president, and in 1939 director. In 1945 he was named executive vice-president and in 1947 he assumed presidency of the company. He was also president and a director of Thermatomic Carbon, and a director of Interchemical Corporation and the Carrier Corporation.

SAMUEL Z. WEAVER

Samuel Z. Weaver, 59, president of Weaver and Hugi, Inc., brokers and importers of fertilizer materials, feed materials and chemicals, died on March 22nd at his home in Englewood, N. J. Mr. Weaver was associated with Swift & Co. and Wilson & Co. before organizing Weaver and Hugi 20 years ago.

FEBRUARY TAX TAG SALES

Totaling 1,447,000 equivalent short tons, fertilizer tax tag sales during February, as compiled by The National Fertilizer Association, were second only to the record high for February chalked up in 1949.

The February total, as shown in the table below, was about 1½ per cent below that of February 1949. In the Southern States, tags sold during the month were equivalent to 1,200,000 short tons or 5 per cent less than during the same month of last year. In the Midwest, however, sales totaling 227,000 equivalent short tons represented a 27½ per cent increase over the corresponding figure of a year ago. With the potash strike ended, March figures should show an improvement.

LET YOUR PLANTS BE YOUR GUIDE

Practically all vegetable crops respond to a side-dressing of a complete fertilizer according to C. H. Nissley vegetable extension specialist of the New Jersey Experiment Station after they have attained full growth and when the plants are maturing their fruit. This he says is especially true of melons and cucumbers, which respond to an extra application of complete fertilizer after the vines reach a length of 24 inches or more.

The amount to use will depend on the fertility of the soil and the previous applications of fertilizer. A side-dressing should not be made unless the plants indicate a need for it. Let your plants be your guide.

U. S. AGENCY REFUSES BIDS ON NITROGEN MATERIAL

In a surprise development all bids submitted to the Federal Supply Service for nitrogenous fertilizer materials were thrown out by the agency. A new invitation is being sent out for offers to supply 12,000 tons of the materials. The new bids will be opened on April 3rd.

Officials did not explain why they refused the more than 25 bids made under the March 15th offer, but in answer to questions they said early delivery dates would be important considerations on the new bids.

At least half of the 12,000 tons must be available by May 15th. The material is intended for Korea, and must contain a minimum of 16 per cent nitrogen.

5-10-10 LEADS N. J. REPORT OF '49 SALES

The recently released figures on tonnage of mixed fertilizers and fertilizer materials sold in New Jersey during 1949 show a continued increase in mixed goods, with 5-10-10 leading by more than three to one.

237,826 tons of mixed goods were sold in The Garden State in 1949 and the top tonnage totals were as follows: 5-10-10, 105,331; 5-10-5, 31,338; 4-12-8, 29,338; 3-9-12, 15,339; 3-12-6, 14,761.

21,805 tons of materials were sold making a state total sales figure of 259,631.

Because of a recent change in the law for reporting dates, this report includes an eight month period (i.e., November and December, 1948, and the first six months of 1949).

FERTILIZER TAX TAG SALES AND REPORTED SHIPMENTS (In Equivalent Short Tons)

COMPILED BY THE NATIONAL FERTILIZER ASSOCIATION

State	February		Calendar Year Cumulative January-February		Fiscal Year Cumulative July-February	
	1950	1949	1950	1949	1949-50	1948-49
Virginia.....	97,714	107,683	180,974	198,450	369,402	389,356
N. Carolina.....	285,033	316,618	371,153	623,946	561,905	1,087,884
S. Carolina.....	198,660	197,580	356,610	371,034	556,754	606,974
Georgia.....	208,697	234,801	358,026	366,496	575,239	626,459
Florida.....	163,028	124,780	301,751	240,573	770,380	588,747
Alabama.....	110,261	159,991	152,100	248,076	317,617	434,440
Tennessee.....	26,795	36,666	42,879	62,895	143,922	204,467
Arkansas.....	24,649	37,834	41,564	66,610	108,982	155,018
Louisiana.....	36,958	33,317	56,589	60,955	113,033	130,376
Texas.....	67,888	41,175	108,242	91,143	323,891	300,449
Total South.....	1,219,733	1,290,445	1,969,888	2,330,178	3,841,125	4,524,170
Indiana.....	73,822	37,161	172,197	133,693	577,616	640,768
Kentucky.....	96,961	92,380	154,376	180,735	320,423	392,064
Missouri.....	56,362	48,425	133,866	116,306	301,850	302,062
Total Midwest.....	227,145	177,966	469,439	430,734	1,199,889	1,334,894
Grand Total.....	1,446,878	1,468,411	2,430,327	2,760,912	5,041,014	5,859,064

BONE MEAL

TANKAGE

BLOOD

SHEEP—COW—POULTRY MANURE

CASTOR POMACE

NITROGENOUS

GROUND TOBACCO STEMS

HOOF MEAL

ALL FERTILIZER MATERIALS

FRANK R. JACKLE

405 Lexington Avenue

New York 17, N. Y.

FERTILIZER MATERIALS MARKET

NEW YORK

Supplies of Chemical Nitrogen Adequate with No Price Changes Reported. Organics in Better Demand with Some Price Increases. Triple Superphosphate in Short Supply. Some European Potash Expected Shortly.

NEW YORK, March 29, 1950

Sulphate of Ammonia

Some additional business of considerable volume was reported booked for shipment mostly to India. Domestic supplies are adequate to take care of the fertilizer trade and no price changes were noted.

Nitrate of Soda

Little change was reported in this material, but as soon as the top dressing demand appears a considerable movement is expected.

Ammonium Nitrate

Demand for this material continues good, mainly on account of price, and several large manufacturers are sold up on their estimated production for this season.

Nitrogenous Tankage

One large producer recently raised the price of this material to \$4.00 per unit of ammonia (\$4.86 per unit N), f.o.b. production point, on account of the increased demand for nearby shipment. Most producers are still sold up for the balance of this season. Some imported material recently arrived at an Atlantic port.

Castor Pomace

This material was still difficult to buy for quick shipment, with last sales made at \$30.50 per ton f.o.b. production points. Demand continued good from various sections.

Organics

Tankage and blood still were in good demand from both fertilizer and feed trade and the production of these materials has declined slightly recently. Blood sold at \$7.75 per

unit of ammonia (\$9.42 per unit N), f.o.b. Eastern points and tankage sold at \$8.00 (\$9.72 per unit N), f.o.b. New York. Soybean meal has advanced sharply the last two weeks due to the strength in soybeans which are being held back from the markets by farmers who are expecting high prices. Soybean meal sold at \$59.00 per ton, f.o.b. Decatur, Ill., in bulk for prompt shipment. Linseed meal was steady at about \$64.50 per ton f.o.b. Eastern points in bulk. Cottonseed meal sold at \$61.00 per ton, f.o.b. Southeastern points.

Fish Meal

Due to increased importations of European and African material, this market declined slightly and supplies were plentiful at Atlantic ports. No sales have been reported as yet for new crop menhaden fish meal although some offerings have been reported which are unattractive to the buyers. The market on the West Coast was reported to be lower on fish meal.

Bone Meal

A slight easing in demand is noted for this material mostly from the feed trade and several large lots of imported material have recently arrived at American ports. Prices in some cases have been shaded slightly to attract business. Raw bone meal is not too plentiful.

Superphosphate

While triple superphosphate is hard to obtain for prompt shipment, supplies of 20 per cent material are plentiful at most production points with no changes in price noted.

Hoof Meal

With last sales on the basis of \$7.50 per unit of ammonia (\$9.12 per unit N), f.o.b. Chicago, demand continued good for this material.

Potash

Shortages are reported in various sections as manufacturers strive to keep their plants going with the available supplies on hand. Several boats with European material are expected shortly at several ports and additional material is expected to arrive in April.

PHILADELPHIA

Some Materials in Good Demand but Supplies Limited. Potash Shipments Normal but Shortage Still Exists.

PHILADELPHIA, March 29, 1950

Inquiry for raw material in general is not too active, though castor pomace and triple superphosphate are an exception. Potash deliveries are reported moving satisfactorily but spot requirements are rather urgent. Nitrogenous tankage is in great demand but not obtainable for prompt or nearby delivery. Price for later delivery is \$4.00 per unit of ammonia (\$4.86 per unit N), f.o.b. producing plants.

Sulphate of Ammonia—Export demand keeps market strong, and domestic movement continues to improve. Supply is fairly ample to meet requirements.

Nitrate of Soda—Situation is normal for this season of the year and stocks are ample for present needs.

Blood, Tankage, Bone—While tankage sold as high as \$9.00 per unit of ammonia (\$10.94 per unit N) in Chicago, present interest is limited to \$7.50 to \$7.75 (\$9.12 to \$9.42 per unit N), with blood somewhat lower per unit. New York market for tankage is rather dull at \$7.25 to \$7.50 (\$8.82 to \$9.12 per unit N). Bone meal is decidedly easier and while \$62.50 per ton is quoted, this is purely nominal. It can be substantially reduced with

business actually presented. Hoof meal is reported quiet with \$7.50 per unit of ammonia (\$9.12 per unit N) asked.

Castor Pomace—Production continues below the demand and most of it is under contract. Some little tonnage sold last week for April shipment at \$30.50 per ton at the refinery.

Fish—Market is quiet and unchanged. Menhaden meal is quoted in Baltimore area at \$160.00 per ton, with foreign at \$150.00 to \$155.00, depending on quality.

Phosphate Rock—Domestic demand is reported as satisfactory and supply is ample for all requirements.

Superphosphate—Stocks of normal are reported in good supply and demand improved. No price changes are indicated. There is quite active call for triple for spot delivery and practically no resale is in evidence.

Potash—While shipments are reported as practically normal, they are not coming through fast enough and the spot situation is still tight. Also, it is reported that some shipments from Europe are two or three weeks behind schedule.

CHARLESTON

Tightness Develops in Almost All Materials. Prices Remain Firm with Advances in Some Organics.

CHARLESTON, March 28, 1950

Organic ammoniates are in tight supply for the next few months. Mineral nitrogen is beginning to tighten as is superphosphate in certain areas. Potash continues short of demand in spite of capacity production.

Organics—Organics for shipment over the next two months continue in tight supply. Producers of domestic nitrogenous continue sold up for the next few months. Prices are nominally around \$4.00 per unit of ammonia (\$4.86 per unit N), in bulk, f.o.b. production points. Dried ground blood and tankage, due to high cost, are in limited use by fertilizer manufacturers. Imported organics are offered for arrival too late to be used this season. Price of imported material is nominally \$4.65 per unit of ammonia (\$5.65 per unit N), c.i.f. Atlantic port.


Castor Pomace—Production continues limited and movement is

primarily against existing contracts. A limited quantity was recently offered for summer shipment at the current \$30.50 per ton price in bags, f.o.b. Northeastern production points. Already producers are in a well sold position for that shipment.

Dried Ground Blood—Chicago market is quiet at around \$7.00 per unit of ammonia (\$8.51 per unit N), with the New York market around \$7.75 (\$9.42 per unit N).

Potash—Although production and shipments are back to normal, the demand continues active and in excess of supply, with some areas suffering acute shortage. Delays in arrivals of vessels bringing imported material has created acute situations among coastal manufacturers.

Ground Cotton Bur Ash—Producers of this source of carbonate of potash continue to receive orders to keep production at capacity level. This material tests 30 per cent to 40 per cent K_2O and 3 per cent to 4 per cent chlorine and is offered at around 65 cents per unit of K_2O in bulk f.o.b. Texas production point, for finely ground material. The unground material is available at



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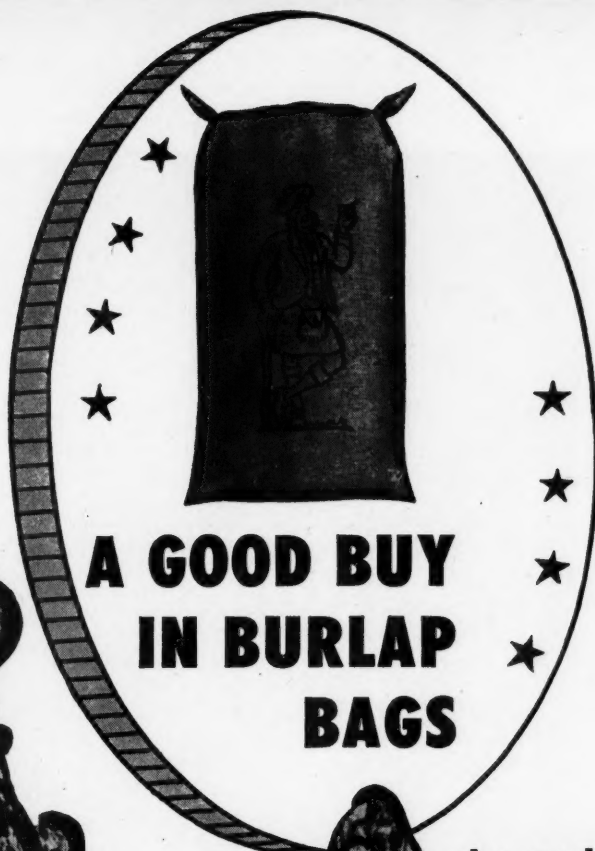
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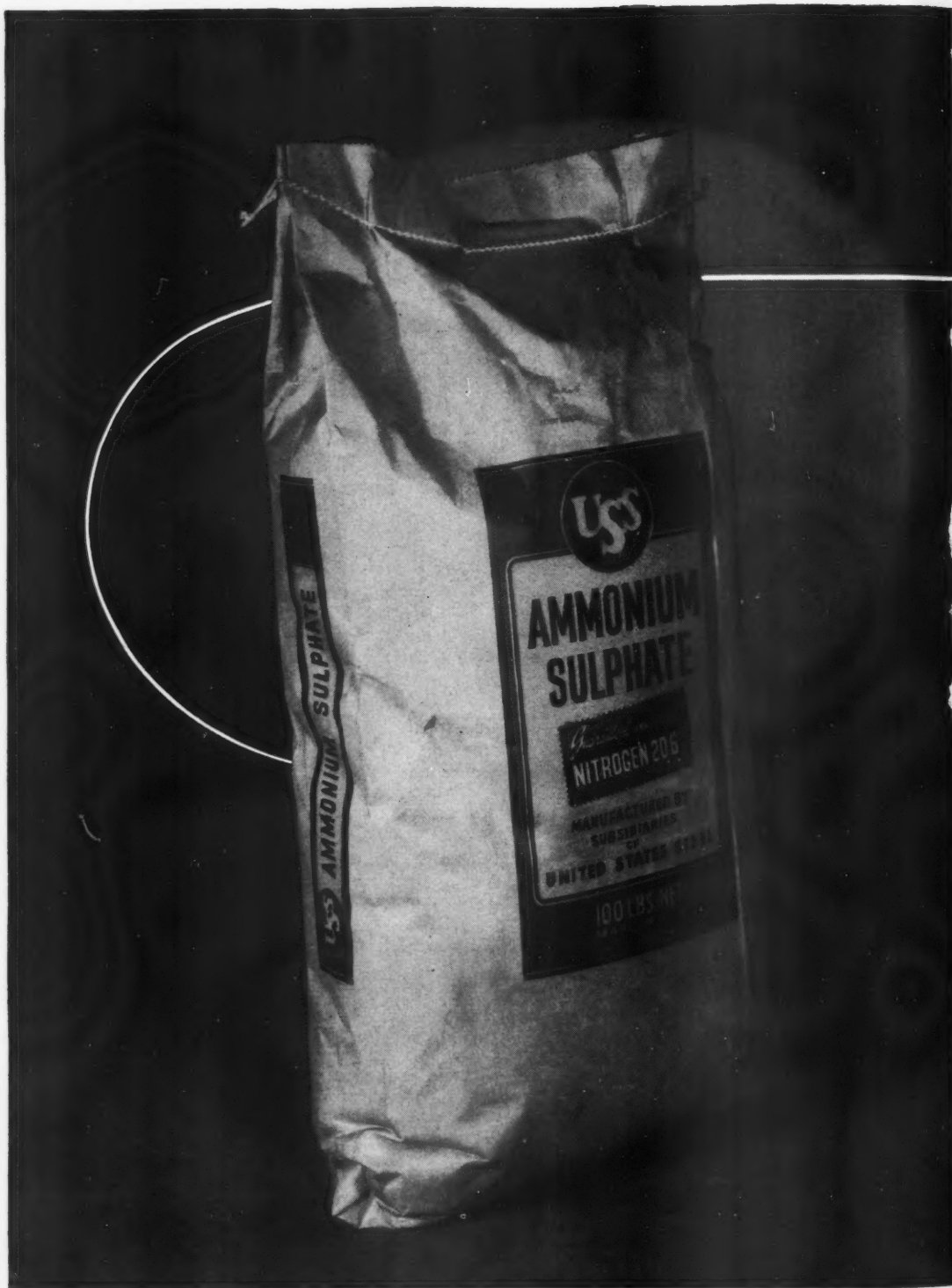
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around 60 cents per unit of K_2O , f.o.b. Texas production point.

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Superphosphate—Demand is heavy for normal superphosphate with shortages developing in isolated cases. Triple superphosphate demand is far in excess of available supply.

Sulphate of Ammonia—Shipments of coke oven material are on the increase as demand strengthens. Synthetic producers in several instances are sold up for the next few months. Prices are firm.

Ammonium Nitrate—Demand has increased to the point where supply cannot fulfill in several areas. Prices remain unchanged.

Nitrate of Soda—Demand continues seasonal and expanding with stocks fully adequate. Prices continue unchanged.

CHICAGO

Organics Market Steady and Prices Firm. Little Change Expected in Near Future.

CHICAGO, March 28, 1950

Animal ammoniates in the Chicago area have remained firmly steady during the past two weeks. The demand continues fairly broad, and during the past 30 days production has fallen off noticeably. No material change is anticipated for the near future and the consensus of opinion appears to be that price levels will in all probability remain approximately unchanged.

Meat scraps, 50 per cent protein,

ground and sacked are generally listed at \$110.00 per ton. Digester tankage, 60 per cent protein, ground and sacked is quoted at \$110.00 to \$115.00 per ton. In some isolated instances buyers are endeavoring to purchase both products at \$2.50 to \$5.00 per ton lower, but no definite business at these prices can be definitely confirmed.

Unground rendered tankage ranges from \$1.90 to \$2.00 per unit of protein, depending upon test and location. Wet rendered tankage is quoted at \$9.25 to \$9.50 (\$11.24 to \$11.55 per unit N) for low testing product and \$8.50 to \$8.75 (\$10.33 to \$10.63 per unit N) for high test material. Dried blood is somewhat easier with offerings at around \$7.00 per unit of ammonia (\$8.51 per unit N) and no trading. Steamed bone meal, 65 per cent B.P.L., is quoted at \$70.00 to \$75.00 per ton bagged, and raw bone meal 4½-45 per cent at \$60.00 to \$65.00 per ton.

PROMOTIONAL AGRONOMISTS APPOINTED BY SPENCER

Two new promotional agronomists for Iowa and Illinois have



W. P. Morrison



Alvin Bull

been added to the Spencer Chemical Company's technical services staff. According to a recent announcement both men will carry out demonstration and educational work in their respective states.

William P. Morrison, a graduate of the University of Illinois in Agronomy, will make his headquarters in Champaign, Illinois.

Alvin Bull, a graduate of Iowa State College in Agronomy, will make his headquarters in Ames, Iowa.

JANUARY SULPHATE OF AMMONIA

The January output of by-product sulphate of ammonia dropped about 4 per cent from the December figures, according to the U. S. Bureau of Mines. In addition, only 3,242 tons were produced from purchased synthetic ammonia, compared with 5,131 tons in December. Shipments also dropped by 9 and 33 per cent respectively, with the result that stocks on hand at the end of January had risen to 93,454 tons, which is almost four times as much as was available on January 31, 1949.

	Jan. 1950 Tons	Dec. 1949 Tons	Jan. 1949 Tons
Production			
Sulphate of Ammonia			
By-product.....	68,312	71,272	73,826
Purchased Am.....	3,242	5,131	4,490
Ammonia Liquor.....	2,078	2,039	2,156
Shipments			
Sulphate of Ammonia			
By-product.....	44,125	49,050	73,330
Purchased Am.....	3,254	4,867	4,271
Ammonia Liquor.....	1,216	1,492	1,666
Stocks on hand			
Sulphate of Ammonia.....	93,454	69,702	24,705
Ammonia Liquor.....	879	854	625

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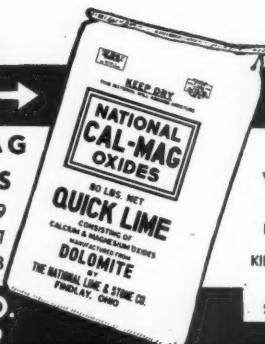
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COMMERCE DEPARTMENT SEES GOOD YEAR FOR FERTILIZER

The January 1950 issue of the *Chemical and Drugs*, a U. S. Department of Commerce publication states that consumption of commercial fertilizers in 1950 may surpass that of any previous year.

In a section devoted to the "Outlook for the Chemical Industry in 1950" the Department while recognizing that the expected reduction in farm income would normally result in decreased fertilizer consumption points to a number of factors which may overcome this tendency:

1. Large veteran insurance refunds to farmer veterans which will furnish additional funds for the purchase of fertilizers.
2. Widespread educational efforts designed to improve methods of application and to make it easier for farmers to recognize their soils' requirements.
3. Exports of fertilizers under the Economic Cooperation Administration program.

4. Removal of all export controls on nitrogenous fertilizer.

On the negative side is a return to "prewar seasonal purchase of fertilizer materials, both by the manufacturer and consumer," coupled with insufficient storage facilities at producing plants. This situation, says the article, may cause some delays in deliveries in the early part of the year.

The article expresses the opinion that existing supplies of phosphate rock, superphosphate, nitrogen and potash, and facilities for producing additional quantities of these materials are adequate to meet even increased consumer demand.

CHASE BAG SAFETY WINS COMPANY THREE AWARDS

The Kansas City branch of the Chase Bag Company was honored recently by the Liberty Mutual Life Insurance Company, when the latter presented its safety award flag to W. J. Muller, Manager of the Chase Kansas City plant.

The selection of the Chase Bag Company was based on their record

of compiling over 500,000 man-hours of production without a day lost.

The presentation was one of three awards earned by Chase factories recently for safety achievements. The Chase Chagrin Falls, Ohio paper plant was declared winner of Greater Cleveland Safety Council's Nineteenth Annual Campaign in the Paper and Paper Bag Companies Group. The other award was earned by the Chase Bag Branch in Reidsville, North Carolina after completing over half a million man hours without a lost time accident.

RESULTS OF POTATO RESEARCH IN 21 YEARS

In summarizing the experiments in Maine on the effect of source of potash on yield and starch content of potatoes over a period of 21 years, Dr. G. L. Terman writes, in the *American Potato Journal*, Aug. 1949, "As an average for all experiments muriate, or chloride, and sulphate of potash resulted in practically the same yield of tubers. In certain experiments and years the

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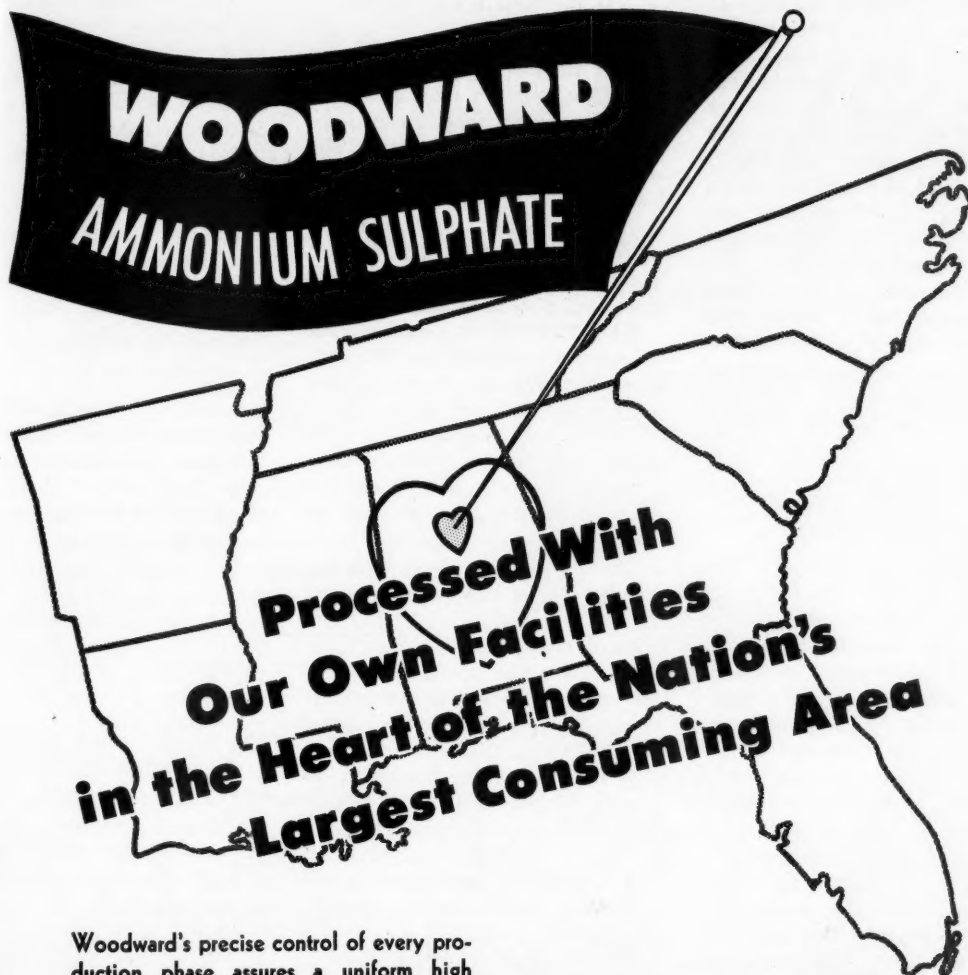
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sulphate resulted in slightly higher yields, and in others the yields from chloride were slightly higher. In experiments where a difference resulted, yields from a combination of the phosphate and nitrate source (of potash) were similar to those from sulphate. Sulphate of potash consistently resulted in higher starch content of the tubers and a higher yield of starch per acre than did chloride. This difference ranged from 0.6 to 1.8 per cent starch and increases in yields of starch from approximately 200 to 450 lbs. per acre. The variety of potato was found to be a more important factor affecting starch content of the tubers than was the source of potash."

NITROGEN SPRAY FOR ORCHARDS

Recent researches by C. P. Harley, Plant Physiologist, U.S.D.A., indicate that nitrogen can be fed to certain plants through the leaves. Sprays containing urea (NuGreen), when applied to apple trees at petal fall and again in the first and second cover sprays, have increased chlorophyll and nitrogen content of the leaves. With certain varieties these sprays have increased growth, fruit set, and total yield; however, there is a strong possibility that some varieties may not be so responsive. It has been reported that urea can be combined with insecticides and fungicides without reducing the effectiveness of any of the materials. Some slight foliage injury following urea sprayings has been observed, although it was not sufficiently serious to cause concern.

ONE BUSHEL OF CORN FOR EACH 2 1/4 POUNDS OF NITROGEN IN TEST

A bushel of corn for each 2 1/4 pounds of nitrogen was the average return for fertilizer used in Mississippi Experiment Station corn fertilization tests conducted in 1949, according to Howard V. Jordan, leader of the project. Branch Experiment Station superintendents worked on the test with Mr. Jordan, who is a soil scientist of the Mississippi Department of Agriculture.

When yields at six locations were averaged it was found that 17 bushels of corn per acre were produced without nitrogen applications. When 120 pounds of nitrogen per acre were applied, yields at the six locations averaged 70.6 bushels per acre. Adapted hybrids were used in all cases.

The following practices are recommended by the Experiment Station for corn production in the hill sections of Mississippi.

Three hundred pounds of 12-8-8, 500 pounds of 8-8-8, or 600 pounds of 6-8-8 or 6-8-4 should be applied before planting. These rates of complete fertilizer supply from 36 to 40 pounds of nitrogen and variable rates of phosphoric acid and potash. A choice among the fertilizers can best be made on the basis of a soil test, which will be made if a sample of soil from the field is sent to the Soil Testing Lab at State College.

The corn should be side dressed with 60 to 90 pounds of nitrogen per acre when the crop is knee high. This amount of nitrogen can be added as 400 to 600 pounds of nitrate of soda, 200 to 300 pounds of ammo-

nium nitrate, or 75 to 100 pounds of anhydrous ammonia.

The corn should be spaced to leave 1 plant every 15 or 16 inches in 40 or 42 rows. Adapted hybrids should be grown, as these have been shown better able to capitalize on high-fertility treatments.

In the Delta, 90 to 120 pounds of nitrogen per acre should be applied prior to planting. Phosphate and potash should be used only on a trial basis except where deficiencies have already been determined.

Indiana Conference

(Continued from page 8)

the crop not knowing what happens in between. Dr. Albrecht said that if farmers will watch the health of crops they will tell us much about the health of the soil and what the soil needs to make it healthy.

Dr. Albrecht indicated that we may be overestimating the power of legumes. He said, "The pedigree of legumes says that they take nitrogen from the air but they do not unless we feed the necessary minerals to those legumes. Legumes put nitrogen in the soil in trade for minerals."

Dr. Albrecht concluded his remarks with some thoughts regarding the world food situation. He showed a world map indicating the highly fertile soil areas. These areas are located in the United States, Central South America, South Africa, Eastern Australia, and Russia. He indicated that these areas coincide with the important world powers today. Dr. Albrecht said, "World politics is really food politics or fundamentally soil fertility politics."

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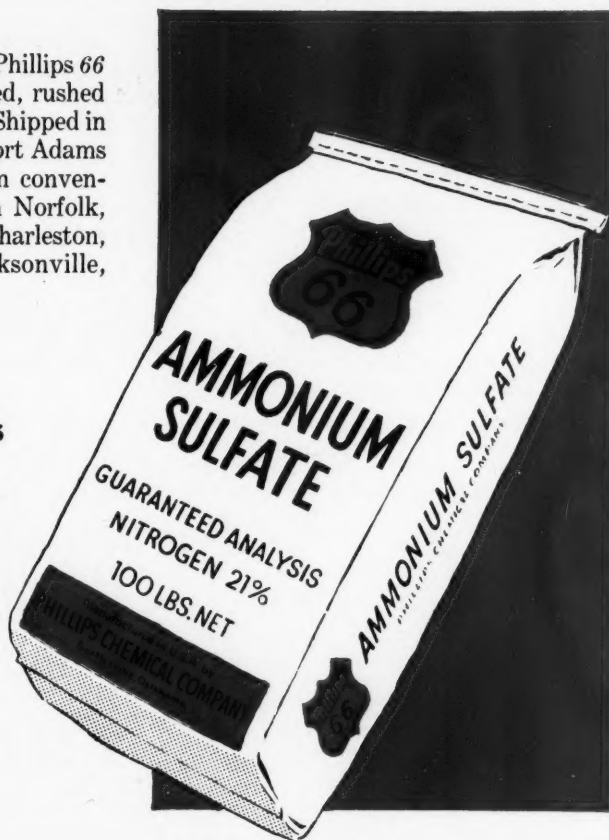
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Keeping ahead of plant diseases

(Continued from page 10)

Before long-time wide-range predictions can be considered we need a great deal more basic knowledge about all the conditions influencing the spread of these diseases. This fundamental investigation is the task of the research program. Through it we hope eventually to discover patterns of interaction between disease, host and environment that will enable the prediction of decisive factors far ahead of their actual occurrence. In the meantime, even the short-range predictions will become more and more accurate.

Organization and Operation of the Forecasting Project

Research Program. Naturally, over such a wide area the particular kind of investigation needed and the special advantages presented for the study of individual problems vary a great deal. This has been recognized by grouping the states into three regions, with one State Experiment Station serving as headquarters at Newark, Del.; North-

central, at Ames, Iowa, and South-eastern at Raleigh, N. C.

The Survey is responsible for the general plan of research and for coordinating the regional studies. The headquarters stations supply facilities, but all the stations in a region take part in the planning. Their experience of local problems is indispensable in setting up practical and effective programs.

At present the research staff is concentrating on late blight. Occurrence of the disease is known, in a general way, to be very closely dependent on fairly cool temperatures and rather constant moisture supply. Discrepancies between expected and observed reaction have been so frequent, however, as to call for further investigation of both organism and environment.

The environmental phase of this complex problem is being studied with the aid of 35 hygrothermographs placed in potato and tomato fields throughout the Warning Service area. The continuous record of microclimate and the equally detailed observations on the appearance and progress of late blight, ob-

tained together in the same field, should clarify the relative influence of specific weather elements, and indicate also whether the action of any one factor is modified in varying combinations with others.

Already it has been shown that dew is much more important as a source of moisture supply than had been realized.

Activity on the two hosts, potato and tomato, is noticeably different. Explanation may be partly environmental, and the microclimatic studies will help here also. However, specific attack on this point, by isolation and cross inoculation between the two hosts, has so far supported previous indications that specialized host strains of the organism exist.

Dissemination is another problem for investigation. How far the spores of the fungus can be carried in the air and still retain their power to infect has never been satisfactorily determined. The research staff is trying to find the answer, both on the ground and in the upper air, by means of spore traps and aeroplanes.

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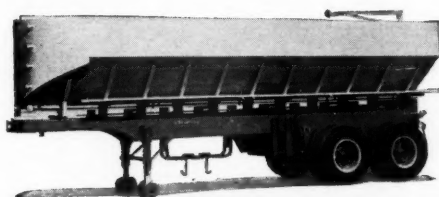
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Warning Service. With its own experience and that of its predecessors, the Warning Service has now been operating long enough to have demonstrated its usefulness.

Its organization is as truly co-operative as that of the Survey. It operates through plant pathologists designated to work with it in each state (and in each cooperating Province in Canada). Current information on the progress of each disease included in its service—to name them again, late blight of potato and tomato, tobacco blue mold, and downy mildew of cucurbit crops—is reported promptly to the Plant Disease Survey. The Survey compiles these reports into a warning letter sent to all key pathologists. From the reports on occurrence and severity in localities with an earlier season, together with their own knowledge about the behavior of these diseases under local conditions, the key pathologists obtain a fairly accurate idea as to whether these crops are likely to be affected in their own regions, and if so, how soon and how seriously.

Thus they can warn growers in advance to be ready to protect their plantings. By arrangement with the National Agricultural Chemical Association, the fungicide industry also received the warning letters, to let dealers know where specific fungicides are likely to be needed.

The Survey does not make any control recommendations itself. Its responsibility is the issuing of the warning letters and the coordination of the Warning Service.

Since key pathologists are solely responsible both for the information obtained and the recommendations made in their areas, the distribution of the warning letters is limited to them and to the fungicide industry.

The dotted lines on the chart (Figure 1) show clearly the sources of the Warning Service reports, how the information is transmitted to the Survey, how the Survey uses it in warning letters, summaries, and special articles in the *Plant Disease Reporter* or in trade journals, and how the recommendations derived from the warning letters finally reach farmer and fungicide dealer.

The County Agents who are part of the Warning Service can see how important their cooperation is at both ends of the chain. They watch plantings and relay their own and farmers' observations to key pathologists as soon as there is anything to report. They urge farmers to do their part by paying attention to the warnings; explain the basis for the recommendations and the advantages of following them carefully. They are, in fact, an essential part of the Warning Service organization.

Some further considerations:

The forecasts are as important when the disease is scarce or absent as when it is raging. The whole point is to eliminate chance and waste, as far as possible, as much by knowing when not, as when, to use control measures.

Obviously best results can be expected from this type of organization only when all the participants give it their fullest cooperation.

Conclusion: Help Wanted

We can sum up the objectives of the Survey and the Forecasting

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Project this way: to help plant pathologists make use of past experience with plant diseases, keep track of present problems, and anticipate future needs.

The Survey and the Forecasting Project are comparable to military intelligence forces. The Survey is concerned with information fundamental to the whole strategy of the war against plant diseases, whereas the Forecasting Project spies out the land for specific battles.

You can see that one of the uncertainties always confronting both the Survey and its collaborators, and the Forecasting Project and its key pathologists, is whether they are obtaining all the information they need to keep up with plant disease occurrence in general, and to put the Warning Service in particular on the most accurate and speediest basis possible. Further, there is always the special worry whether some one circumstance of strategic importance may not have been overlooked. It is not possible for either collaborators or key pathologists to see for themselves everywhere in a state.

County Agents possess exceptionally favorable opportunities for observing the development and effects of plant diseases. Many already are enlisted in the Survey's intelligence service.

Summary

Plant diseases vary in importance from time to time and place to place, but their total effect makes them one of the important enemies of the farmer.

"Keeping ahead of plant diseases" means keeping up with their present activity and everything affecting it.

Past history of a disease often gives clues of critical importance for present use: this history can only be obtained through records made at the time the events occurred.

To record and make best use of these current events demands field observations, a reporting system, and prompt dissemination of information. This is the function of the Plant Disease Survey.

The Crop Plant Disease Forecasting Project concentrates on the continuous prompt collection and distribution of information regarding the progress of certain important diseases during the current season, so that plant pathologists can judge with some accuracy what control measures are likely to be needed in their areas. For this purpose the Forecasting Project conducts a co-operative Warning Service. In addition, a research staff is studying the factors involved in spread and importance of the diseases concerned, so that we may detect and prepare for these factors as far in advance as possible.

NITROGEN GIVES MORE GRAIN IN ARKANSAS

Farmers using a nitrogen top-dressing on oats this spring will get an extra 15 to 20 bushels of grain per acre, Arkansas Extension Soils Specialist C. F. Lund declared today.

That's the conclusion drawn from results of experiments and demonstrations carried on in different sections of Arkansas, Mr. Lund explained. He recommended using 30 to 40 pounds of nitrogen per acre on the oats.

The fertilizer should be applied just before the plants begin to make rapid growth in the spring, Mr. Lund said, adding that good results have been obtained in Arkansas by applying the fertilizer anytime during March.

Indiana Fertilizer

(Continued from page 6)

much less at harvest time on the mineral fertilized-nitrated areas of heavy grain than in the lighter grain growth. However, after harvest the legume seedlings developed rapidly and little, if any, difference was evident in most of the trials by fall. In some cases, especially where summer rainfall has been light, the heavy grain growth reduced the stands of the seeding in it. Where such seedlings are made in the grain crop, it seems wise to limit the nitrogen application on both wheat and oats to 20 to 25 pounds of elemental nitrogen per acre.

Coupled with these fertilizer demonstrations were strip comparisons of a number of varieties of wheat and oats and these "double barreled" trials furnished excellent material for field demonstration meetings. In many cases combining the comparison strips was a part of the meeting. The yields were computed and test weight per bushel determined on the ground. Farmers attending the demonstration meeting saw the ability of the various varieties to resist disease, lodging and straw breaking as well as the yields and test weight per bushel. Results of the demonstration trials are reported in Mimeographs AY 1-B and AY 3-B.

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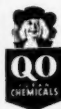
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Barrett Div., Allied Chemical & Dye Corp., New York City
Commercial Solvents Corp., New York City
Lion Oil Co. El Dorado, Ark.
Phillips Chemical Co., Bartlesville, Okla.
Spencer Chemical Co., Kansas City, Mo.

AMMONIUM NITRATE

Lion Oil Co., El Dorado, Ark.
Phillips Chemical Co., Bartlesville, Okla.
Spencer Chemical Co., Kansas City, Mo.

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Chase Bag Co., Chicago, Ill.
Fulton Bag & Cotton Mills, Atlanta, Ga.
Mente & Co. Inc., New Orleans, La.
Virginia-Carolina Chemical Corp., Richmond, Va.

BAG MANUFACTURERS—Cotton

Bemis Bros. Bag Co., St. Louis, Mo.
Chase Bag Co., Chicago, Ill.
Fulton Bag & Cotton Mills, Atlanta, Ga.
Mente & Co. Inc., New Orleans, La.
Virginia-Carolina Chemical Corp., Richmond, Va.

BAG MANUFACTURERS—Paper

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Fulton Bag & Cotton Mills, Atlanta, Ga.
Hammond Bag & Paper Co., Welisburg, W. Va.
International Paper Co., Bagpak Div., New York City
Jaite Company, The, Jaite, Ohio
Kraft Bag Corporation, New York City
Mente & Co. Inc., New Orleans, La.
Raymond Bag Co., Middletown, Ohio
St. Regis Paper Co., New York City
Virginia Carolina Chemical Corp., Richmond, Va.

BAGS—Dealers and Brokers

Ashcraft-Wilkinson Co., Atlanta, Ga.
Huber & Company, New York City
McIver & Son, Alex. M., Charleston, S. C.

BAG CLOSING MACHINES

International Paper Co., Bagpak Div., New York City
St. Regis Paper Co., New York City

BAG PRINTING MACHINES

Schmutz Mfg. Co., Louisville, Ky.

BAGGING MACHINES—For Filling Sacks

Atlanta Utility Works, The, East Point, Ga.
St. Regis Paper Co., New York City
Sackett & Sons Co., The A. J., Baltimore, Md.
Sturtevant Mill Company, Boston, Mass.

BONE PRODUCTS—BONE BLACK

American Agricultural Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Davidson Commission Co., The, Chicago, Ill.
Huber & Company, New York City
Jackie, Frank R., New York City
McIver & Son, Alex. M., Charleston, S. C.
Scar-Lipman & Co., New York City
Tuteur & Co., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

BORAX AND BORIC ACID

American Potash and Chem. Corp., New York City

BROKERS

Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Davidson Commission Co., The, Chicago, Ill.
Huber & Company, New York City
Jackie, Frank R., New York City
Keim, Samuel D., Philadelphia, Pa.
McIver & Son, Alex. M., Charleston, S. C.
Scar-Lipman & Co., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

BUCKETS—For Hoists, Cranes, etc.

Hayward Company, The, New York City

BUCKETS—Elevator

Baughman Manufacturing Co., Jerseyville, Ill.
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Stedman Foundry and Mach. Works, Aurora, Ind.

CARS AND CARTS

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Stedman Foundry and Mach. Works, Aurora, Ind.

CASTOR POMACE

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CHEMICALS

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Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Barrett Div., Allied Chemical & Dye Corp., New York City
Commercial Solvents Corp., New York City
Davison Chemical Corporation, Baltimore, Md.
Huber & Company, New York City
International Minerals & Chemical Corporation, Chicago, Ill.
Lion Oil Company, El Dorado, Ark.
McIver & Son, Alex. M., Charleston, S. C.
Phillips Chemical Co., Bartlesville, Okla.
Scar-Lipman & Co., New York City
Spencer Chemical Co., Kansas City, Mo.
United States Steel Corp., New York City
Virginia-Carolina Chemical Corp., Richmond, Va.
Woodward & Dickerson, Inc., Philadelphia, Pa.
Woodward Iron Company, Woodward, Ala.

CHEMISTS AND ASSAYERS

Gascoyne & Co., Baltimore, Md.
Shuey & Company, Inc., Savannah, Ga.
Wiley & Company, Baltimore, Md.

CONDITIONERS

Jackie, Frank R., New York City
Keim, Samuel D., Philadelphia, Pa.
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National Lime & Stone Co., Findlay, Ohio
Quaker Oats Company, Chicago, Ill.

COTTONSEED PRODUCTS

Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
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Scar-Lipman & Co., New York City
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DRYERS

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ENGINEERS—Chemical and Industrial

Chemical Construction Corp., New York City
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Stedman Foundry and Mach. Works, Aurora, Ind.
Sturtevant Mill Company, Boston, Mass.
Titelstad Corporation, Nicolay, New York City

FERTILIZER (Mixed) MANUFACTURERS

American Agricultural Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Davison Chemical Corporation, Baltimore, Md.
International Minerals & Chemical Corporation, Chicago
Southern States Phosphate & Fertilizer Co., Savannah, Ga.
Virginia-Carolina Chemical Corp., Richmond, Va.

FISH SCRAP AND OIL

Ashcraft-Wilkinson Co., Atlanta, Ga.
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Huber & Company, New York City
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McIver & Son, Alex. M., Charleston, S. C.
Scar-Lipman & Co., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

HOPPERS

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Baker & Bro., H. J., New York City
Scar-Lipman & Co., New York City
Southern States Phosphate & Fertilizer Co., Savannah, Ga.
Woodward & Dickerson, Inc., Philadelphia, Pa.

INSECTICIDES

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LEAD BURNERS

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LIMESTONE

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McIver & Son, Alex. M., Charleston, S. C.
National Lime & Stone Co., Findlay, Ohio

LOADERS—Car and Wagon

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Sackett & Sons Co., The A. J., Baltimore, Md.

MACHINERY—Acid Making and Handling

Atlanta Utility Works, The, East Point, Ga.
Chemical Construction Corp., New York City
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Mach. Works, Aurora, Ind.

MACHINERY—Ammoniating

Sackett & Sons Co., The A. J., Baltimore, Md.
Sturtevant Mill Company, Boston, Mass.

MACHINERY—Grinding and Pulverizing

Atlanta Utility Works, The, East Point, Ga.
Bradley Pulverizer Co., Allentown, Pa.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Mach. Works, Aurora, Ind.
Sturtevant Mill Company, Boston, Mass.

MACHINERY—Material Handling

Atlanta Utility Works, The, East Point, Ga.
Baughman Manufacturing Co., Jerseyville, Ill.
Hayward Company, The, New York City
Hough Co., The Frank G., Libertyville, Ill.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Mach. Works, Aurora, Ind.
Sturtevant Mill Company, Boston, Mass.

MACHINERY—Mixing, Screening and Bagging

Atlanta Utility Works, The, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Mach. Works, Aurora, Ind.
Sturtevant Mill Company, Boston, Mass.
Universal Vibrating Screen Co., Racine, Wis.

MACHINERY—Power Transmission

Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Mach. Works, Aurora, Ind.

MACHINERY—Superphosphate Manufacturing

Atlanta Utility Works, The, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Mach. Works, Aurora, Ind.
Sturtevant Mill Company, Boston, Mass.

MANGANESE SULPHATE

McIver & Son, Alex. M., Charleston, S. C.

MINOR ELEMENTS

Tennessee Corporation, Atlanta, Ga.

MIXERS

Atlanta Utility Works, The, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Mach. Works, Aurora, Ind.
Sturtevant Mill Company, Boston, Mass.

NITRATE OF SODA

American Agricultural Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Barrett Div., Allied Chemical & Dye Corp., New York City
Huber & Company, New York City
International Minerals & Chemical Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Scar-Lipman & Co., New York City

NITROGEN SOLUTIONS

Barrett Div., Allied Chemical & Dye Corp., New York City
Lion Oil Company, El Dorado, Ark.
Phillips Chemical Co., Bartlesville, Okla.
Spencer Chemical Co., Kansas City, Mo.

NITROGENOUS ORGANIC MATERIAL

American Agriculture Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Davidson Commission Co., The, Chicago, Ill.
Huber & Company, New York City
International Minerals & Chemical Corporation, Chicago, Ill.
Jackle, Frank R., New York City
McIver & Son, Alex. M., Charleston, S. C.
Scar-Lipman & Co., New York City
Tuteur & Co., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

NOZZLES—Spray

Monarch Mfg. Works, Philadelphia, Pa.

PHOSPHATE ROCK

American Agricultural Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Huber & Company, New York City
Davison Chemical Corporation, Baltimore, Md.
International Minerals & Chemical Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Virginia-Carolina Chemical Corp., Richmond, Va.

PLANT CONSTRUCTION—Fertilizer and Acid

Atlanta Utility Works, The, East Point, Ga.
Chemical Construction Corp., New York City
Monsanto Chemical Co., St. Louis, Mo.
Sackett & Sons Co., The A. J., Baltimore, Md.
Southern Lead Burning Co., Atlanta, Ga.
Stedman Foundry and Mach. Works, Aurora, Ind.
Sturtevant Mill Company, Boston, Mass.
Titlestad Corporation, Nicolay, New York City

POTASH SALTS—Dealers and Brokers

American Agricultural Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Huber & Company, New York City
International Minerals & Chemical Corporation, Chicago, Ill.
Jackle, Frank R., New York City
McIver & Son, Alex. M., Charleston, S. C.
Scar-Lipman & Co., New York City

POTASH SALTS—Manufacturers

American Potash and Chemical Corp., New York City
Potash Co. of America, New York City
International Minerals & Chemical Corporation, Chicago, Ill.
United States Potash Co., New York City

PRINTING PRESSES—Bag

Schmutz Mfg. Co., Louisville, Ky.

REPAIR PARTS AND CASTINGS

Atlanta Utility Works, The, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Mach. Works, Aurora, Ind.

BUYERS' GUIDE

SCALES—Including Automatic Bagging

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Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Mach. Works, Aurora, Ind.

SCREENS

Atlanta Utility Works, The, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Mach. Works, Aurora, Ind.
Sturtevant Mill Company, Boston, Mass.
Universal Vibrating Screen Co., Racine, Wis.

SEPARATORS—Air

Sackett & Sons Co., The A. J., Baltimore, Md.
Sturtevant Mill Co., Boston, Mass.

SPRAYS—Acid Chambers

Monarch Mfg. Works, Inc., Philadelphia, Pa.

SULPHATE OF AMMONIA

American Agricultural Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Barrett Div., Allied Chemical & Dye Corp., New York City
Huber & Company, New York City
Jackle, Frank R., New York City
Lion Oil Co., El Dorado, Ark.
McIver & Son, Alex. M., Charleston, S. C.
Phillips Chemical Co., Bartlesville, Okla.
Scar-Lipman & Co., New York City
United States Steel Corp., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.
Woodward Iron Company, Woodward, Ala.

SULPHUR

Ashcraft-Wilkinson Co., Atlanta, Ga.
Texas Gulf Sulphur Co., New York City

SULPHURIC ACID

American Agricultural Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Huber & Company, New York City
International Minerals & Chemical Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Southern States Phosphate Fertilizer Co., Savannah, Ga.
U.S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Virginia-Carolina Chemical Corp., Richmond, Va.

SUPERPHOSPHATE

American Agricultural Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Davison Chemical Corporation, Baltimore, Md.
Huber & Company, New York City
International Minerals & Chemical Corporation, Chicago, Ill.
Jackle, Frank R., New York City
McIver & Son, Alex. M., Charleston, S. C.
Southern States Phosphate Fertilizer Co., Savannah, Ga.
U.S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Virginia-Carolina Chemical Corp., Richmond, Va.

SUPERPHOSPHATE—Concentrated

Armour Fertilizer Works, Atlanta, Ga.
International Minerals & Chemical Corporation, Chicago, Ill.
U.S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Virginia-Carolina Chemical Corp., Richmond, Va.

TANKAGE

American Agricultural Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Davidson Commission Co., The, Chicago, Ill.
International Minerals & Chemical Corporation, Chicago, Ill.
Jackle, Frank R., New York City
McIver & Son, Alex. M., Charleston, S. C.
Woodward & Dickerson, Inc., Philadelphia, Pa.

VALVES

Atlanta Utility Works, The, East Point, Ga.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

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(SINCE 1898)

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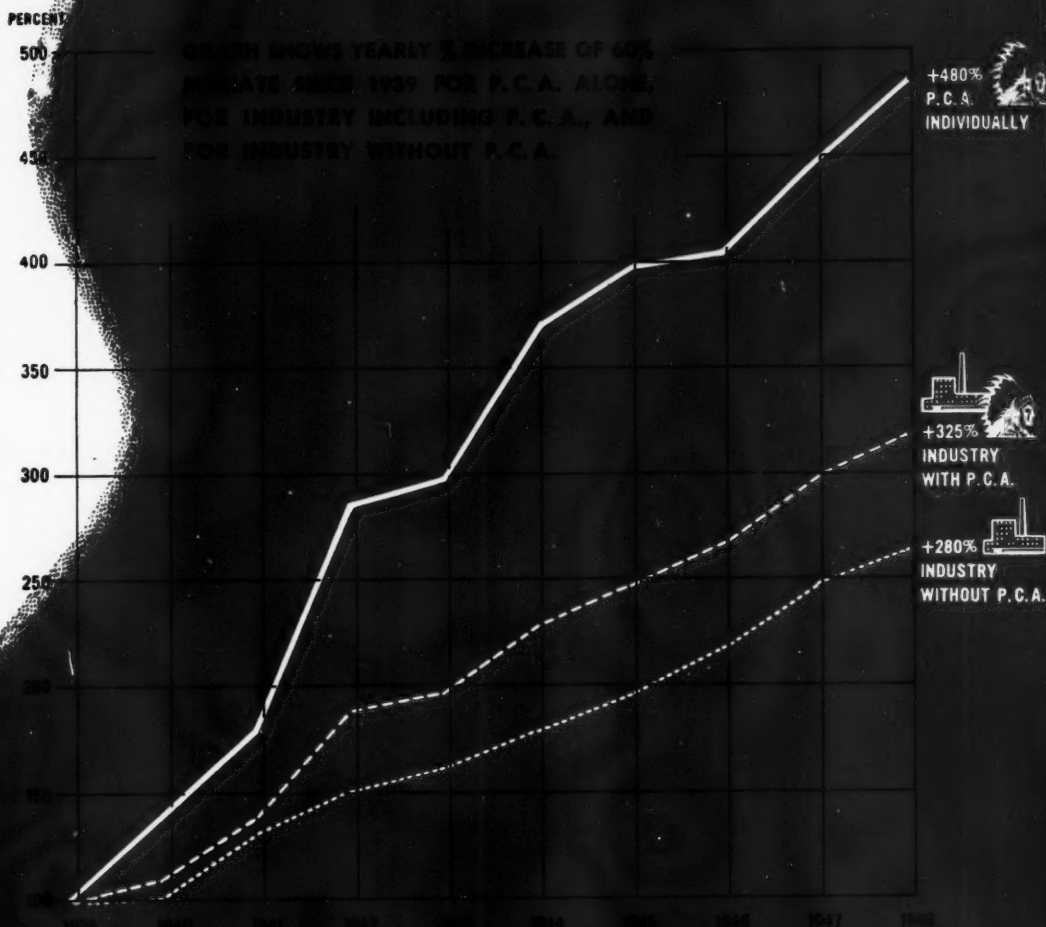
HOME OFFICE: ATLANTA, GA.

BRANCHES:
NORFOLK, VA.
CHARLESTON, S. C.
GREENVILLE, MISS.
TAMPA, FLA.

CABLE ADDRESS:
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been doing some figuring...



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95% of all P.C.A.'s '48 deliveries were in the form of 60% Muriate. Our new \$4,000,000 production and refining facilities now are operating. Our deliveries for '49-'50 will break all previous records. In fact, P.C.A.'s production capacity for 60% Muriate this year will exceed by some 150,000 tons the entire potash consumption—all grades—of the nation ten years ago.

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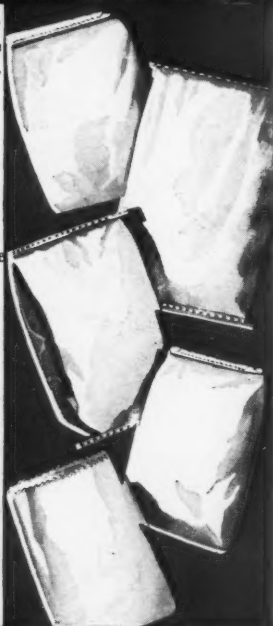


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If your product
 fits into a bag—we'll make
 the bag to fit your product.

Ammonium Nitrate
 Ammonium Sulphate
 Superphosphate
 Complete Fertilizer
 Free Materials

Inquiries Invited



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A DIVISION OF GILMAN PAPER CO.

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